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brates of Indiana, his first paper upon the birds dating from 1882. In 1890 he published an annotated catalogue (135 pages) of the birds of the state, and now we have a more pretentious paper from him,¹ enumerating 321 species actually known from the state, and in a supplementary list 81 additional species, which, while occurring in adjacent states, have never been reported from Indiana. The present volume is more than a catalogue; it is a manual of the ornithology of the state, with analytical keys, descriptions of the species, and bits of bird biography, some copied, but many original and showing a familiarity with the birds in the field. A greater value to the agriculturist is found in the accounts of the economic importance of many species, especial stress being laid upon the food and upon the agency which many birds perform in the distribution of the seeds of useless and noxious plants. The *American Naturalist* has often had occasion to speak in high terms of the zoological work done in Indiana, and this work by Mr. Butler is but another instance in the same line.

Fishes of the Canary Islands. — In the *Proceedings of the Academy of Natural Sciences of Philadelphia* is a list of fishes collected by O. F. Cook, at the Canary Islands. Fifty-four species are enumerated, four of them new. The fauna of these islands is essentially that of the Mediterranean, showing little in common with the West Indies. There are, however, some differences from the Mediterranean fauna, appearing in the fact that some of the common types of the latter are replaced by closely allied but distinct species. There is no evidence of difference between the Canary fish fauna and that of the Madeiras.

Development of Chilopods. — All facts concerning the development of the Chilopoda are of interest, and this short paper by Dr. Heymons² contains much of importance. A complete paper is promised later. The egg contains a central unsegmented yolk with segmentation nuclei. Some of the segmentation cells migrate to the surface and from the blastoderm. The yolk-cells arise in part from the nuclei which remain in the yolk, in part from elements which arise from the blastoderm. These immigrant yolk-cells cannot be distinguished from the entoderm cells, which arise in the same manner from all parts of the ectoderm. A gastrular groove does not exist.

¹ The Birds of Indiana. Ext. 22d Report of the Department of Geology and Natural Resources of Indiana, 1897. pp. 515-1187. (Published 1898.)

² Sitzungsber. k. preuss. Akad. Wissensch., Bd. xviii (1898).

The entoderm cells arrange themselves as a one-layered epithelium. The body consists of a primary cephalic plate, a primary anal piece (telson), and the metameres between these, as follows: (1) an antennular segment; (2) antennal segment; (3) intercalary segment; (4) mandibular segment; (5 and 6) two maxillary segments; (7) segment of the maxilliped; (8-28) body segments; (29 and 30) genital segments. These are shown not only by the external appearances but by the ganglia as well. The protocerebrum consists of (1) the archicerebrum arising in the clypeus; (2) two pairs of ganglia in the primary head plate; (3) the optic ganglia (which arise by delamination); (4) a pair of ganglia in the antennular segment. The antennal¹ segment gives rise to the deutocerebrum, while the intercalated segment gives rise to the tritocerebrum. There is no ganglion in the telson. The sympathetic system arises from the fore-gut; the dorsal cardiac nerve from the mid-dorsal ectoderm. The head or salivary glands are purely ectodermal and cannot be compared to nephridia. Cœlomic cavities occur in each segment (thirty pairs), the cephalic plate and telson excepted. The unpaired gonad and its duct are paired in origin, and their cavities arise from the cœlom, and in the adult traces of the left of the two primary ducts can be found. The genital ducts have, as in Hexapods, an ectodermal termination, from which arise the two paired accessory glands.

These facts go to show a close relationship to the Hexapods, and to support the view that chilopods and diplopods are, at least, very remote from each other; in other words, that a natural group of myriapods does not exist.

J. S. K.

The Aarbog, of the Bergen (Norway) Museum for 1897 maintains the high standard of this publication in the past. Among the papers which it contains are the following: R. Collett, an account of the beavers in Norway, illustrated by a dozen half-tone plates from photographs. The number of beavers now existing in Norway is estimated at about 100. Collett found no parasites on any of the specimens which he examined. K. F. Koldrup reviews the rocks of the Ekersund-Soggendal region. James A. Grieg describes a specimen of the cetacean *Mesoplodon bidens*, stranded on the Norwegian coast in 1895, with notes on other Scandinavian specimens. He contributes in a second paper notes on other cetaceans. R. Collett describes and figures a hybrid between *Lagopus mutus* and *Tetrao tetrix*. K. E. Schreiner describes the eyes of several free-living chætopods.

¹ Heymons says antennular segment, evidently a slip of the pen.

The sixty-fourth volume of the *Zeitschrift für wissenschaftliche Zoologie* begins with a monograph (384 pages) of the serpents belonging to the family Boidæ, by J. Zenneck, of Strassburg. He enumerates 69 species, and had as material for his studies over 560 specimens. The article is illustrated by eight plates of details, color patterns, etc.

Under the title "The Karkinokosm, or World of Crustacea," the Rev. Thomas R. B. Stebbing is publishing in *Knowledge* a series of interesting popular articles on Crustacea. The illustrations, selected from various sources, are well reproduced.

BOTANY.

Frank's Agricultural Botany. — Nearly every art and profession gradually gathers to itself a special series of text-books in allied sciences. To those expounding that part of botany most useful to the student of agriculture is now added an English translation of the little manual of Professor Frank of Berlin.¹ While the occasion for such a book may not be obvious at a first glance, its author enjoys a reputation in the field chosen which entitles his work to a place wherever scientific agriculture is taught.

T.

The Wisconsin Survey. — In common with most of the richer states, Wisconsin has at various times provided for the exploration of its natural resources, but for some years no appropriations had been made for the continuation of this important work until about two years ago, when, the matter having been taken in hand by the State Academy of Sciences, Arts, and Letters,² a legislative appropriation was obtained for the prosecution of a new geological and natural history survey of the state. When it was learned that Professor Birge had been made director, it became evident that the work would be conscientiously and efficiently carried on in such a manner as to supply both scientific and economic results. The recent publication of the first two bulletins of the Survey³ justifies

¹ *A Manual of Agricultural Botany.* From the German of Dr. A. B. Frank. Translated by John W. Patterson. Edinburgh and London, William Blackwood & Sons, 1898. x + 199 pp., 133 illustrations.

² *Trans. Wis. Acad.*, vol. x, p. 595. 1 map.

³ *Wis. Geol. and Nat. Hist. Survey.* Bulletin No. 1 (Economic Series, No. 1). On the Forestry Conditions of Northern Wisconsin. By Filibert Roth. vi +